WHAT IS CLAIMED IS:

1.   An audio-video synchronous playback control system which outputs coded audio data to an external audio decoding device of an external audio output device so that the coded audio data will be decoded and played back by the external audio decoding device, while playing

5   back video data maintaining synchronization between the audio data playback and the video data playback, comprising:

an audio processing means which generates silent data of a size corresponding to the size of audio data which is obtained by decoding the coded audio data outputted to the external audio decoding device;

10   an internal audio output means which plays back or processes the silent data which are generated by the audio processing means;

a video data playback means which plays back the video data; and

an audio-video synchronous playback control means which controls the video data playback of the video data playback means maintaining

15   the synchronization with the audio data playback of the external audio decoding device based on the amount of the silent data which are played back or processed by the internal audio output means.

2.   An audio-video synchronous playback control system as claimed in claim 1, wherein:

the audio processing means includes a synchronous playback time calculation means for calculating a synchronous playback time, which

5   means playback time of the silent data, based on the amount of the silent data which are played back or processed by the internal audio output means, and

the audio-video synchronous playback control means controls the video data playback of the video data playback means maintaining the

10   synchronization with the audio data playback of the external audio decoding device, based on the synchronous playback time which is

calculated by the synchronous playback time calculation means.

3.   An audio-video synchronous playback control system as claimed in claim 2, wherein:

the audio-video synchronous playback control means calculates a reference frame number, which means the number of frames which

5   should have been played back by the video data playback means, based on the synchronous playback time calculated by the synchronous playback time calculation means,

compares the number of frames which have been actually played back by the video data playback means with the reference frame number,

10   and

 · adjusts the progress of the video data playback of the video data playback means if there is a difference between the number of the · actually-played-back frames and the reference frame number.

4.   An audio-video synchronous playback control system as claimed in claim 3, wherein the audio-video synchronous playback control means judges that the video data playback of the video data playback means is behind the audio data playback of the external audio decoding

5   device and thus executes the frame drop operation if the number of the actually-played-back frames is smaller than the reference frame number, and

judges that the video data playback is ahead of the audio data playback and thus suspends the operation of the video data playback

10   means if the number of the actually-played-back frames is larger than the reference frame number.

5.   An audio-video synchronous playback control system as claimed in claim 1, wherein the audio processing means which generates

the silent data includes:

an audio information analysis means which figures out the size of one unit of the coded audio data and the size of audio data which is obtained by decoding the one unit of the coded audio data; and

a silent data generation means which calculates the size of the audio data which is obtained by decoding the coded audio data outputted to the external audio decoding device by use of the sizes figured out by the audio information analysis means and generates the silent data of the calculated size.

6.   An audio-video synchronous playback control system as claimed in claim 2, wherein:

the audio-video synchronous playback control means is supplied with information concerning the amount of the coded audio data which are played back by the external audio decoding device of the external audio output device,

obtains a processed coded audio data total amount, which means the total amount of the coded audio data which have been played back by the external audio decoding device, based on the information supplied from the external audio decoding device,

calculates an external playback time, which means logical playback time of the coded audio data which have been played back by the external audio decoding device, based on the processed coded audio data total amount,

calculates an internal playback time, which means logical playback time of the silent data which have been played back or processed by the internal audio output means, based on the total amount of the silent data which have been played back or processed by the internal audio output means,

compares the external playback time with the internal playback

time, and

adjusts the synchronization between the audio data playback of the external audio decoding device and the video data playback of the video data playback means if there is a time difference between the external playback time and the internal playback time.

7. An audio-video synchronous playback control system as claimed in claim 6, wherein if there is a time difference between the external playback time and the internal playback time, the audio-video synchronous playback control means executes the adjustment of the synchronization between the audio data playback of the external audio decoding device and the video data playback of the video data playback means by adding or subtracting the time difference to/from the synchronous playback time which is calculated by the synchronous playback time calculation means.

8. An audio-video synchronous playback control system as claimed in claim 6, wherein if there is a time difference between the external playback time and the internal playback time, the audio-video synchronous playback control means executes the adjustment of the synchronization between the audio data playback of the external audio decoding device and the video data playback of the video data playback means by outputting dummy coded audio data of a size corresponding to the time difference to the external audio decoding device or decreasing the amount of the coded audio data which are sent to the external audio decoding device corresponding to the time difference.

9. An audio-video synchronous playback control system as claimed in claim 6, wherein if there is a time difference between the external playback time and the internal playback time, the audio-video

synchronous playback control means executes the adjustment of the
5   synchronization between the audio data playback of the external audio
decoding device and the video data playback of the video data playback
means by adding or subtracting silent data of a size corresponding to the
time difference to/from the silent data which are generated by the audio
processing means.

10.   An audio-video synchronous playback control system as
claimed in claim 1, further comprising an internal audio decoding means
for decoding the coded audio data and thereby generating audio data
when the operation mode of the audio-video synchronous playback control
5   system is internal audio playback mode, wherein:
in the internal audio playback mode, the internal audio output
means plays back the audio data generated by the internal audio
decoding means, and
the audio-video synchronous playback control means controls the
10   video data playback of the video data playback means maintaining the
synchronization with the audio data playback of the internal audio
decoding means based on the amount of the audio data which are played
back by the internal audio output means.

11.   An audio-video synchronous playback control method for an
audio-video synchronous playback control system which outputs coded
audio data to an external audio decoding device of an external audio
output device so that the coded audio data will be decoded and played
5   back by the external audio decoding device, while playing back video data
maintaining synchronization between the audio data playback and the
video data playback, comprising the steps of:
a silent data generation step in which silent data of a size
corresponding to the size of audio data which is obtained by decoding the

10   coded audio data outputted to the external audio decoding device is generated;

an internal audio output step in which the silent data which are generated in the silent data generation step are played back or processed by an internal audio output means of the audio-video synchronous

15   playback control system;

a video data playback step in which the video data are played back by a video data playback means of the audio-video synchronous playback control system; and

an audio-video synchronous playback control step in which the

20   video data playback of the video data playback means in the video data playback step is controlled maintaining the synchronization with the audio data playback of the external audio decoding device based on the amount of the silent data which are played back or processed by the internal audio output means in the internal audio output step.

12.   An audio-video synchronous playback control method as claimed in claim 11, wherein in the audio-video synchronous playback control step:

a synchronous playback time, which means playback time of the

5   silent data, is calculated based on the amount of the silent data which are played back or processed by the internal audio output means in the internal audio output step, and

the video data playback of the video data playback means in the video data playback step is controlled maintaining the synchronization

10   with the audio data playback of the external audio decoding device, based on the synchronous playback time.

13.   An audio-video synchronous playback control method as claimed in claim 12, wherein the audio-video synchronous playback

control step includes:

a reference frame number calculation step in which a reference frame number, which means the number of frames which should have been played back by the video data playback means in the video data playback step, is calculated based on the synchronous playback time;

a frame number comparison step in which the number of frames which have been actually played back by the video data playback means in the video data playback step is compared with the reference frame number; and

a video data playback progress adjustment step in which the progress of the video data playback of the video data playback means in the video data playback step is adjusted if there is a difference between the number of the actually-played-back frames and the reference frame number.

14.   An audio-video synchronous playback control method as claimed in claim 13, wherein in the video data playback progress adjustment step:

if the number of the actually-played-back frames is smaller than the reference frame number, the video data playback of the video data playback means is judged to be behind the audio data playback of the external audio decoding device and the frame drop operation is executed, and

if the number of the actually-played-back frames is larger than the reference frame number, the video data playback is judged to be ahead of the audio data playback and the operation of the video data playback means is suspended.

15.   An audio-video synchronous playback control method as claimed in claim 11, wherein the silent data generation step includes:

an audio information analysis step in which the size of one unit of the coded audio data and the size of audio data which is obtained by

5 decoding the one unit of the coded audio data are figured out;

an audio data size calculation step in which the size of the audio data which is obtained by decoding the coded audio data outputted to the external audio decoding device is calculated by use of the sizes figured out in the audio information analysis step; and

10 a generation step in which the silent data of the size calculated in the audio data size calculation step is generated.

16. An audio-video synchronous playback control method as claimed in claim 12, wherein the audio-video synchronous playback control step includes:

an information reception step in which the audio-video

5 synchronous playback control system receives information concerning the amount of the coded audio data which are played back by the external audio decoding device of the external audio output device;

a processed coded audio data total amount calculation step in which a processed coded audio data total amount, which means the total

10 amount of the coded audio data which have been played back by the external audio decoding device, is calculated based on the information received in the information reception step;

an external playback time calculation step in which an external playback time, which means logical playback time of the coded audio data

15 which have been played back by the external audio decoding device, is calculated based on the processed coded audio data total amount;

an internal playback time calculation step in which an internal playback time, which means logical playback time of the silent data which have been played back or processed by the internal audio output means,

20 is calculated based on the total amount of the silent data which have been

played back or processed by the internal audio output means;

a playback time comparison step in which the external playback time is compared with the internal playback time; and

25   a synchronization adjustment step in which the synchronization between the audio data playback of the external audio decoding device and the video data playback of the video data playback means is adjusted if there is a time difference between the external playback time and the internal playback time in the playback time comparison step.

17.   An audio-video synchronous playback control method as claimed in claim 16, wherein in the synchronization adjustment step:

the adjustment of the synchronization between the audio data playback of the external audio decoding device and the video data
5   playback of the video data playback means is executed by adding or subtracting the time difference to/from the synchronous playback time.

18.   An audio-video synchronous playback control method as claimed in claim 16, wherein in the synchronization adjustment step:

the adjustment of the synchronization between the audio data playback of the external audio decoding device and the video data
5   playback of the video data playback means is executed by outputting dummy coded audio data of a size corresponding to the time difference to the external audio decoding device or decreasing the amount of the coded audio data which are sent to the external audio decoding device corresponding to the time difference.

19.   An audio-video synchronous playback control method as claimed in claim 16, wherein in the synchronization adjustment step:

the adjustment of the synchronization between the audio data playback of the external audio decoding device and the video data

5 playback of the video data playback means is executed by adding or subtracting silent data of a size corresponding to the time difference to/from the silent data which are generated in the silent data generation step.

20. A machine-readable record medium storing a program for instructing an audio-video synchronous playback control system, which is implemented by a computer, MPU (MicroProcessor Unit), DSP (Digital Signal Processor), etc. and which outputs coded audio data to an external

5 audio decoding device of an external audio output device so that the coded audio data will be decoded and played back by the external audio decoding device while playing back video data maintaining synchronization between the audio data playback and the video data playback, to execute an audio-video synchronous playback control process

10 comprising the steps of:

a silent data generation step in which silent data of a size corresponding to the size of audio data which is obtained by decoding the coded audio data outputted to the external audio decoding device is generated;

15 an internal audio output step in which the silent data which are generated in the silent data generation step are played back or processed by an internal audio output means of the audio-video synchronous playback control system;

a video data playback step in which the video data are played back

20 by a video data playback means of the audio-video synchronous playback control system; and

an audio-video synchronous playback control step in which the video data playback of the video data playback means in the video data playback step is controlled maintaining the synchronization with the

25 audio data playback of the external audio decoding device based on the

amount of the silent data which are played back or processed by the internal audio output means in the internal audio output step.

21. A machine-readable record medium as claimed in claim 20, wherein in the audio-video synchronous playback control step:

a synchronous playback time, which means playback time of the silent data, is calculated based on the amount of the silent data which are

5 played back or processed by the internal audio output means in the internal audio output step, and

the video data playback of the video data playback means in the video data playback step is controlled maintaining the synchronization with the audio data playback of the external audio decoding device, based

10 on the synchronous playback time.

22. A machine-readable record medium as claimed in claim 21, wherein the audio-video synchronous playback control step includes:

a reference frame number calculation step in which a reference frame number, which means the number of frames which should have

5 been played back by the video data playback means in the video data playback step, is calculated based on the synchronous playback time;

a frame number comparison step in which the number of frames which have been actually played back by the video data playback means in the video data playback step is compared with the reference frame

10 number; and

a video data playback progress adjustment step in which the progress of the video data playback of the video data playback means in the video data playback step is adjusted if there is a difference between the number of the actually-played-back frames and the reference frame

15 number.

23. A machine-readable record medium as claimed in claim 22, wherein in the video data playback progress adjustment step:

if the number of the actually-played-back frames is smaller than the reference frame number, the video data playback of the video data

5 playback means is judged to be behind the audio data playback of the external audio decoding device and the frame drop operation is executed, and

if the number of the actually-played-back frames is larger than the reference frame number, the video data playback is judged to be ahead of

10 the audio data playback and the operation of the video data playback means is suspended.

24. A machine-readable record medium as claimed in claim 20, wherein the silent data generation step includes:

an audio information analysis step in which the size of one unit of the coded audio data and the size of audio data which is obtained by

5 decoding the one unit of the coded audio data are figured out;

an audio data size calculation step in which the size of the audio data which is obtained by decoding the coded audio data outputted to the external audio decoding device is calculated by use of the sizes figured out in the audio information analysis step; and

10 a generation step in which the silent data of the size calculated in the audio data size calculation step is generated.

25. A machine-readable record medium as claimed in claim 21, wherein the audio-video synchronous playback control step includes:

an information reception step in which the audio-video synchronous playback control system receives information concerning the

5 amount of the coded audio data which are played back by the external audio decoding device of the external audio output device;

a processed coded audio data total amount calculation step in which a processed coded audio data total amount, which means the total amount of the coded audio data which have been played back by the external audio decoding device, is calculated based on the information received in the information reception step;

an external playback time calculation step in which an external playback time, which means logical playback time of the coded audio data which have been played back by the external audio decoding device, is calculated based on the processed coded audio data total amount;

an internal playback time calculation step in which an internal playback time, which means logical playback time of the silent data which have been played back or processed by the internal audio output means, is calculated based on the total amount of the silent data which have been played back or processed by the internal audio output means;

a playback time comparison step in which the external playback time is compared with the internal playback time; and

a synchronization adjustment step in which the synchronization between the audio data playback of the external audio decoding device and the video data playback of the video data playback means is adjusted if there is a time difference between the external playback time and the internal playback time in the playback time comparison step.

26. A machine-readable record medium as claimed in claim 25, wherein in the synchronization adjustment step:

the adjustment of the synchronization between the audio data playback of the external audio decoding device and the video data playback of the video data playback means is executed by adding or subtracting the time difference to/from the synchronous playback time.

27. A machine-readable record medium as claimed in claim 25,

wherein in the synchronization adjustment step:

the adjustment of the synchronization between the audio data playback of the external audio decoding device and the video data
5   playback of the video data playback means is executed by outputting dummy coded audio data of a size corresponding to the time difference to the external audio decoding device or decreasing the amount of the coded audio data which are sent to the external audio decoding device corresponding to the time difference.

28.   A machine-readable record medium as claimed in claim 25, wherein in the synchronization adjustment step:

the adjustment of the synchronization between the audio data playback of the external audio decoding device and the video data
5   playback of the video data playback means is executed by adding or subtracting silent data of a size corresponding to the time difference to/from the silent data which are generated in the silent data generation step.